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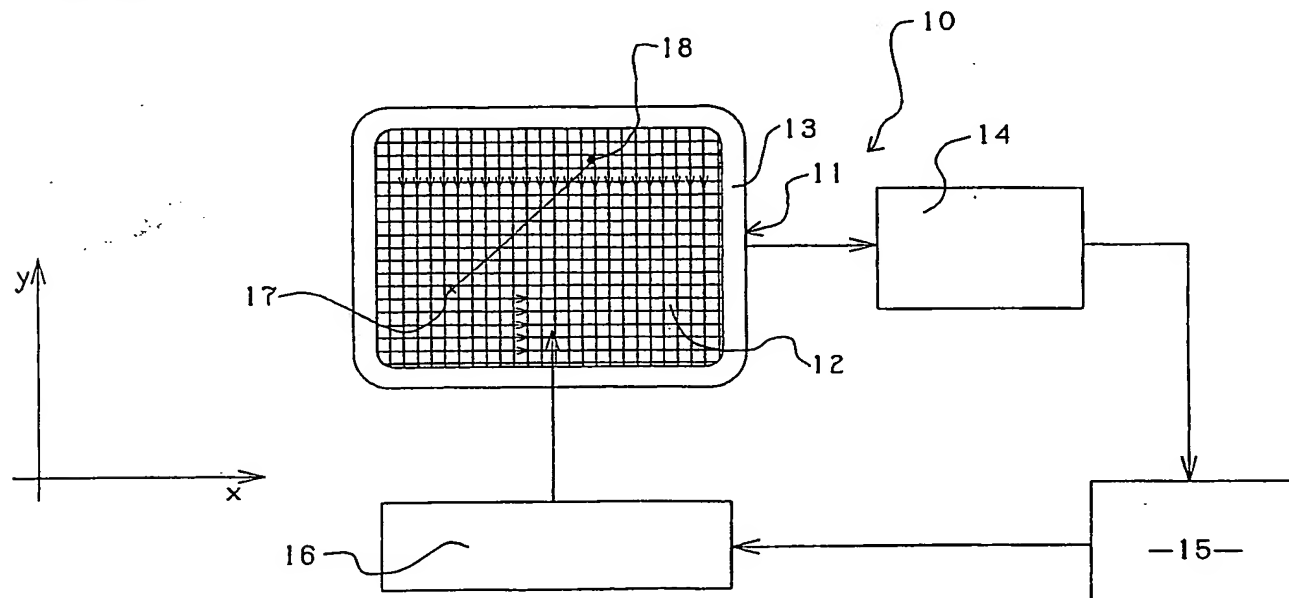
(56) Documents cited
 EP 0421025 A1 EP 0398055 A2 EP 0369718 A2
 EP 0279652 A2 EP 0156593 A2

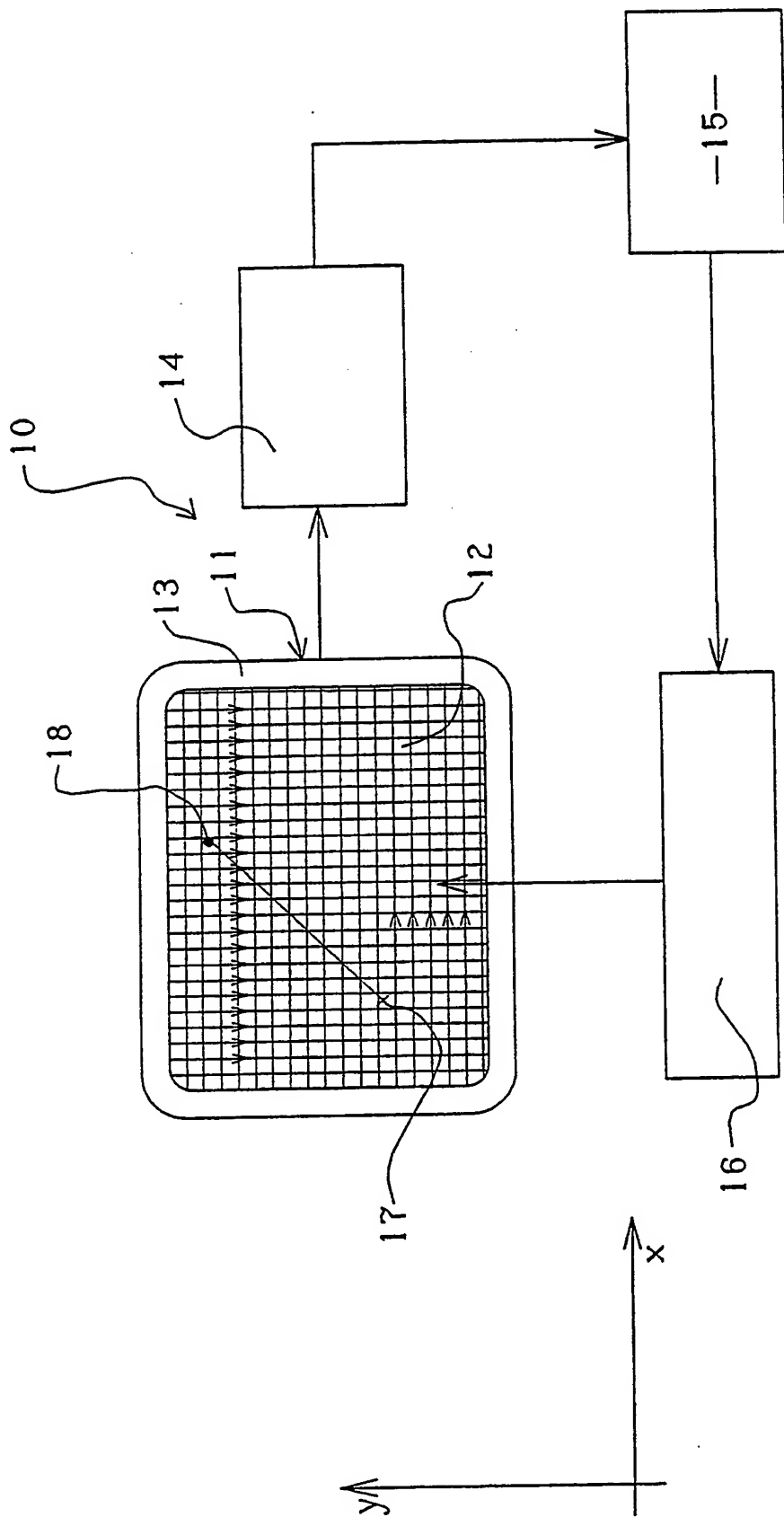
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(54) Touch screen emulates mouse

(57) An information input system for a host computer 16 comprises an absolute position pointing device 11 e.g. a touch screen first translation means 14 to receive and translate a signal from the absolute position pointing device 11 and provide an output to a second translation means 15 which is adapted to receive and translate signals from a relative position pointing device e.g. a mouse, the second translation means 15 in use, translating the output from the first translation means 14 and providing an input for further processing by the host computer 16.

This arrangement allows mouse emulation using a touch screen.





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Title: Information input system for a computer

Description of Invention

This invention relates to an information input system for a computer and to a method of inputting information into a computer.

In addition to keyboards, computer input systems are known which comprise pointing devices.

One such pointing device is a mouse which comprises a ball which is rotated as the mouse is moved over a surface, thereby to manipulate the position of a cursor on the computer display screen, such as for example, a VDU or monitor.

The amount of rotation of the ball in any direction is monitored by a mouse driver which may be a hardware device such as a processor and associated ROM, or software loaded into the computer, the mouse driver translating signals from the mouse and providing an appropriate input for further processing in the computer.

Such a device is a relative position pointing device in that the cursor on the computer display screen is moved relative to the distance moved by the mouse on its surface.

The mouse conventionally has one or more control buttons so that when the cursor is positioned at a selected position on the computer display screen, a selected computer function can be initiated. For example, a button may be pressed on the mouse to select a menu option when the cursor is positioned adjacent the displayed menu option, or a button may be pressed once or twice within a defined time limit, to select one or other of two options, for example, one button press for "yes" and two button presses for "no".

Another such pointing device is a touch sensitive device by which a computer user can, by pointing to a selected position of the device with a stylus,

for example his finger, position a cursor at that position. The computer function would then have to be selected by other means such as operation of an appropriate key on a keyboard.

Alternatively, by pointing to a particular area on the device, a selected computer function can be initiated.

In each case, the output from the touch sensitive device is fed to a touch sensitive device driver which translates signals from such touch sensitive device and provides an input for further processing by the computer.

Such a device is an absolute position pointing device in that the computer user points to the device at a position which corresponds exactly to a position of the computer display screen.

It will be appreciated that use of such a touch sensitive device or other absolute position pointing device is not as flexible as that of a mouse in that the absolute position pointing device is not able to be used both to position a cursor and select a computer function in one operation.

According to one aspect of the invention we provide an information input system for a host computer comprising an absolute position pointing device, first translation means to receive and translate a signal from the absolute position pointing device and provide an output to a second translation means which is adapted to receive and translate signals from a relative position pointing device, the second translation means in use, translating the output from the first translation means and providing an input for further processing by the host computer.

Thus the second translation means translates the output from the first translation means as if it were an output from a relative position pointing device. In this way, the absolute position pointing device can be used to emulate a relative position pointing device such as a mouse.

In one embodiment, the absolute position pointing device may comprise a touch sensitive device which detects where a stylus touches the device.

The touch sensitive device may be integral with the actual computer display screen, or may be separate from the computer display screen. The position of the stylus may be detected by interruption of at least two intersecting electromagnetic beams such as infrared beams, or by detecting changes in resistance or capacitance of elements of an array, for examples only.

In each case, the touch sensitive device will provide a signal to the first translation means about where the device has been touched by the stylus.

Conveniently, the touch sensitive device is adapted to detect the position of more than one stylus touching the device simultaneously. Thus the touch sensitive device or other absolute position pointing device may provide a first signal to the first translation means in response to the device being touched by a first stylus, to indicate a position to which a cursor is to be positioned, and a second signal to the first translation means in response to the device being touched by a second stylus to indicate that a particular computer function is to be performed.

The first translation means may comprise a computing device having a processing means and memory, and similarly the second translation means may comprise a computing device having a processing means and memory.

In one arrangement, the second translation means is adapted to receive and translate signals from a relative position pointing device comprising a mouse.

According to a second aspect of the invention we provide a method of providing an input to a host computer comprising the steps of pointing to a selected position of a computer display screen using an absolute position pointing device, feeding a signal from the absolute pointing device to a first translation means which translates the signal from the absolute position pointing device and provides an output, feeding the output of the first translation means to a second translation means, the second translation means being adapted to receive and translate signals as if they were from a relative position pointing device, and

providing an input from the second translation means to the host computer for further processing.

Where the absolute position pointing device comprises a touch sensitive device, the method may include pointing to the selected position by touching the computer display screen or a touch screen separate from the computer display screen, with a stylus such as a finger.

The method may include touching the touch sensitive device with a first stylus to provide a first signal to indicate a selected position of the computer display screen where a cursor is to be positioned, and touching the touch sensitive device with a second stylus to provide a further signal to the first translation means in order to provide a command to the host computer to initiate a selected computer function.

The second stylus may touch the touch sensitive device either at a predefined position relative to the first stylus e.g. at or adjacent to the right or left of the first stylus, or at a predetermined area of the touch screen e.g. to select one of a plurality of alternative functions.

According to a third aspect of the invention, we provide a method of providing an input to a host computer utilising a touch sensitive device which is adapted to detect where a stylus touches the device, the method comprising the steps of touching the touch sensitive device with a first stylus and feeding a resulting first signal from the touch sensitive device to a translation means which translates the signal and provides a first input to the first computer, maintaining the first stylus touching the touch sensitive device whilst touching the touch sensitive device with a second stylus, and feeding a resulting further signal from the touch sensitive device to the translation means which translates the further signal and provides a further input to the host computer.

The first or further signal may be indicative of a selected position of a computer display screen at which it is desired to position a cursor, and the other of the first and further signals may provide a command to the host computer to initiate a selected computer function.

The invention will now be described with reference to the accompanying drawing which is an illustrative diagram of an information input system in accordance with the invention.

Referring to the drawing, there is shown an information input system 10 for a host computer 16, the system comprising an absolute position pointing device 11 which in this example is a touch screen of the type which comprises a plurality of infrared beams along the X and Y axes of a computer display screen 12, the infrared beams being generated by infrared transmitters located in a bezel 13 of the computer display screen 12.

Each infrared beam has an associated detector at a side of the screen 12 opposite to the transmitter, and in the event that infrared beams are interrupted e.g. by a stylus such as a finger touching the screen 12, the position at which the screen 12 is touched can be detected.

The construction of such a touch screen 11 is well known in the art and thus further description is not considered necessary.

The touch screen 11 thus generates output signals which comprise information about the position at which the screen 12 has been touched. The signals are fed to a first translation means which comprises a touch screen driver 14 which is adapted to translate the signals and provide an appropriate output to a second translation means 15.

The touch screen driver 14 comprises a computing device having a processing means and memory.

The second translation means 15 also comprises a computing device having a processing means a memory and is adapted to receive and translate signals from a relative position pointing device such as a mouse, and provide an input for further processing by the host computer 16. Thus the second translation means 15 may comprise a conventional mouse driver as is readily commercially available at the date hereof.

The touch screen driver 14 thus translates signals from the touch screen 11 to provide an output which is in a form which is readable by the mouse driver 15.

The system 10 may be operated as follows.

A stylus e.g. a computer user's finger, may touch the screen 12 at a first selected position 17 and be moved across the screen 12 to a second selected position 18 thus interrupting various of the X and Y infrared beams. Thus the touch screen 11 provides signals indicating the selected position 17, and the path of movement of the stylus 11 to the second selected position 18, to the touch screen driver 14. The touch screen driver 14 provides a translated output in response which would be that which the mouse driver 15 would receive if a conventional mouse had been moved relatively to the screen from position 17 to position 18. Accordingly a cursor can be moved by the host computer 16 along the path indicated, by movement of the stylus from position 17 to position 18.

To cause the first computer 16 to perform an operative function such as would be achieved by pressing the control button on a mouse, the computer user, before removing the stylus from the screen 12 e.g. at the second selected position 18, can touch the screen 12 with a second stylus (finger) to interrupt additional infrared beams to thus generate a further signal which is fed to the touch screen driver 14. The touch screen driver 14 is adapted to respond by translating the further signal and providing an output to the mouse driver 15 which the mouse driver 15 would expect to receive if a control button of a mouse had been pressed with the cursor at the second selected position 18.

If desired, the touch screen driver 14 may be arranged to respond to the touch of a second stylus in a defined area of the screen 12 only e.g. to the left of the first stylus/cursor or to respond differently to the touch of a second stylus in different defined areas of the screen 12. Thus when the second stylus touches the screen e.g. to the left of the first stylus/cursor the touch screen driver 14 may respond to provide an input to the mouse driver 15 as if one control button of a mouse had been pressed, and when the stylus touches the screen e.g. to the right

of the first stylus/cursor, the touch screen driver 14 may respond to provide an input to the mouse driver 15 as if a second control button of a mouse had been pressed.

Thus a mouse having two distinct control buttons can be emulated, the touch screen driver 14 providing appropriate translation of the signals received from the touch screen 11 to the mouse driver 15 where the mouse driver 15 is adapted to be driven by a two control button mouse.

If desired, a plurality of distinct areas of the screen 12 may be highlighted on the screen 12 by the host computer 16, any one of which may be touched by the second stylus to cause the computer 16 to perform a selected one of a plurality of different operating functions.

The system described can also emulate a mouse which has a control button which may be pressed once or twice within a predetermined time period, to cause the computer 16 to perform one or other of alternative operating functions.

This may be achieved by the touch screen driver 14 being adapted to respond to and translate a signal from the touch screen 11 created as a result of the screen being touched twice by a second stylus within a predetermined time period, into a form recognisable by the mouse driver 15 as being two pressings of a control button of a mouse within the predetermined time period.

A mouse can be used with a mouse driver in an appropriate system to draw a line for example between first and second selected positions 17,18, by keeping a control button of the mouse depressed whilst the mouse is moved relative to the screen 12 to move a cursor from the one selected position 17 to the second selected position 18.

The system of the present invention is able to emulate such a mouse as follows.

The computer user can place second and third styli (fingers) simultaneously either side of the first stylus which defines the cursor position, on the screen 12 and then all three styli are moved from the first selected position

17 to the second selected position 18 over the screen 12. The touch screen driver 14 may be adapted to respond to signals from screen 12 which indicate that infrared beams have been interrupted by a plurality of distinct styli, and hence the driver 14 provides a translated output to mouse driver 15 which mouse driver 15 would expect to receive from a mouse were an appropriate control button of a mouse held depressed whilst the mouse is moved relative to the screen 12.

It will be appreciated that because the mouse driver 15 is adapted to respond to a relative position pointing device i.e. a mouse, and that it is desirable for a cursor to be positioned at the actual position where the screen 12 is touched, on initial set up of the system, it is necessary to synchronise the position at which the cursor appears on the screen 12 with the touched position detected by the touch screen 11.

Various modifications may be made without departing from the scope of the invention.

For example, in place of a touch screen 11 of the type which has a plurality of infrared beams, any alternative touch sensitive device for example a device of the type which has an array of elements and detects changes in resistance or capacitance of those elements when touched, could be provided. Although the touch screen 11 described enables a user to touch the computer display screen 12 itself, if desired, the touch screen 11 or other touch sensitive device may be separate from the actual computer display screen.

Instead of the touch screen driver 14 responding to second and third styli being touched upon screen 12 and moved over screen 12 in order to draw a line, a line may be drawn by moving the first stylus only after having touched a predefined area on the screen 13 with a second stylus to indicate that such a line should be drawn, the driver 14 translating the signals produced to provide an appropriate signal to mouse driver 15.

Although in the example described, the touch screen driver 14 or other first translation means, and mouse driver 15 or other second translation means are shown as separate drivers, it will be appreciated that in accordance with the

third aspect of the invention, the functions of these two drivers may be achieved by a common device or even by appropriate software run by the host computer 16. Even where the functions of the two drivers 14,15, are separate as described, these functions may be achieved utilising appropriate software run by the host computer 16.

The features disclosed in the foregoing description the following claims or the accompanying drawing, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, or a class or group of substances or compositions, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. An information input system for a host computer comprising an absolute position pointing device, first translation means to receive and translate a signal from the absolute position pointing device and provide an output to a second translation means which is adapted to receive and translate signals from a relative position pointing device, the second translation means in use, translating the output from the first translation means and providing an input for further processing by the host computer.
2. A system according to claim 1 wherein the absolute position pointing device comprises a touch sensitive device which detects where a stylus touches the device.
3. A system according to claim 2 wherein the touch sensitive device is integral with the actual computer display screen.
4. A system according to claim 2 wherein the touch sensitive device is separate from the computer display screen.
5. A system according to any one of claims 2 to 4 wherein the position of the stylus is detected by the interruption of at least two intersecting electromagnetic beams such as infrared beams, or by detecting changes in resistance or capacitance of elements of an array.
6. A system according to any one of claims 1 to 5 wherein the touch sensitive device is adapted to detect the position of more than one stylus touching the device simultaneously.

7. A system according to claim 6 wherein the absolute position pointing device provides a first signal to the first translation means in response to the device being touched by a first stylus, to indicate a position to which a cursor is to be positioned, and a second signal to the first translation means in response to the device being touched by a second stylus to indicate that a particular computer function is to be performed.
8. A system according to any one of the preceding claims wherein the ~~first translation means comprises a computing device having a processing means~~ and memory.
9. A system according to any one of claims 1 to 8 wherein the second translation means comprises a computing device having a processing means and memory.
10. A system according to any one of the preceding claims wherein the second translation means is adapted to receive and translate signals from a relative position pointing device comprising a mouse.
11. An information input system for a host computer substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
12. A method of providing an input to a host computer comprising the steps of pointing to a selected position of a computer display screen using an absolute position pointing device, feeding a signal from the absolute pointing device to a first translation means which translates the signal from the absolute position pointing device and provides an output, feeding the output of the first translation means to a second translation means, the second translation means being adapted to receive and translate signals as if they were from a relative

position pointing device, and providing an input from the second translation means to the host computer for further processing.

13. A method according to claim 12 wherein where the absolute position pointing device comprises a touch sensitive device, the method includes pointing to the selected position by touching the computer display screen or a touch screen separate from the computer display screen, with a stylus such as a finger.
14. A method according to claim 13 wherein the method includes touching the touch sensitive device with a first stylus to provide a first signal to indicate a selected position of the computer display screen where a cursor is to be positioned, and touching the touch sensitive device with a second stylus to provide a further signal to the first translation means in order to provide a command to the host computer to initiate a selected computer function.
15. A method according to claim 14 wherein to select one of a plurality of alternative functions the second stylus touches the touch sensitive device at a predefined position relative to the first stylus.
16. A method according to claim 14 wherein to select one of a plurality of alternative functions, the second stylus touches the touch sensitive device at a predetermined area of the touch screen.
17. A method of providing an input to a host computer utilising a touch sensitive device which is adapted to detect where a stylus touches the device, the method comprising the steps of touching the touch sensitive device with a first stylus and feeding a resulting first signal from the touch sensitive device to a translation means which translates the signal and provides a first input to the host computer, maintaining the first stylus touching the touch sensitive device whilst touching the touch sensitive device with a second stylus, and feeding a resulting

further signal from the touch sensitive device to the translation means which translates the further signal and provides a further input to the host computer.

18. A method according to claim 17 wherein the first or further signal is indicative of a selected position of a computer display screen at which a cursor is to be positioned, and the other of the first and further signals provides a command to the host computer to initiate a selected computer function.

19. A method of providing an input to a host computer such as hereinbefore described with reference to and as shown in the accompanying drawings.

20. Any novel feature or novel combination of features as herein described and/or shown in the accompanying drawings.

Relevant Technical fields

(i) UK CI (Edition K) G4A (AKS) H4T (TAFA, TBBG,
TBLA, TBLC, TBLM, TBLX)
(ii) Int CL (Edition 5) G06F 3/033

Search Examiner

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Databases (see over)

(i) UK Patent Office
ONLINE DATABASES: WPI
(ii)

Date of Search
13 JULY 1992

Documents considered relevant following a search in respect of claims 1-18

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0421025 A1 (PHILIPS) Whole document	1-9, 12-18
X	EP 0398055 A2 (IBM) Whole document	1-9, 12-18
A	EP 0369718 A2 (CANON) Whole document	
X	EP 0279652 A2 (SENSOR FRAME) Especially column 8 line 15 to column 9 line 29	1-9, 12-18
X	EP 0156593 A2 (AMP) Especially page 12 line 25 to page 13 line 2	1-9, 12-18

Category	Identity of document and relevant passages	Relevant to claim(s)

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